



	<p style="text-align: center;">  CHEMISTRY 302L Syllabus </p> <p style="text-align: center;">  </p> <p style="text-align: center;">FALL 2009</p>	
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SYLLABUS
CHEM 302 Lab Section A
Microscale Organic Chemistry

Course Description: Experimental course in which students learn to employ microscale techniques for synthesis, isolation, purification, and characterization of organic molecules. Students learn to identify organic unknowns through qualitative analysis, and they obtain and interpret gc, IR, and NMR spectra. Students become more familiar with organic terminology and learn to write and critique ACS-style lab reports.

Prerequisites/Co-Requisite: CHEM 301 and CHEM 301 Lab/CHEM 302 Students should have the study skills and time to devote to assignments and studying for successful completion of this course.

Learning Outcomes: Successful students will:

- Acquire the skills needed to perform microscale techniques of extraction, distillation, fractional crystallization, sublimation, chromatography and qualitative organic chemistry
- Use critical thinking skills to analyze experimental results; and
- Become more scientifically-literate by acquiring and applying an enhanced technical vocabulary and utilizing current resources

Course Requirements and Evaluation:

Students will be required to read and comprehend course material covered in class and in independent study assignments. Students should be familiar with the use of Blackboard and should review any material or assignments placed on the course web site. Students will be required to explore specific web sites in order to investigate topics more thoroughly.

Method of Instruction: Instruction will consist of a variety of the following techniques: pre-lab lectures with discussions of concepts; collaborative work on pre-lab write-ups; web site explorations; familiarization with laboratory equipment and instrumentation (gc, IR, NMR, etc.); hands on experience through laboratory experiments; instruction on interpretation of various spectra in the lecture and as a part of laboratory experiments; and instruction in technical writing skills through critique of student presented materials.

Assessment Methods:

Each exam will have multiple choice questions, descriptive or short essay answers, and identification of spectra characteristics. The technical writing component of the term grade will come from pre-lab reports, six formal lab reports, four condensed lab reports and one essay. The lab reports and essays will be graded using rubrics having elements for science content and technical writing. Students will work as teams in lab sessions and in writing pre-lab reports to develop collaborative skills. They have several occasions to critically review other students' reports. Student participation and skill level will be assessed with anecdotal notation by the instructor during pre-lab discussions and lab sessions.

Grading Policy: 10 Point Scale

- a. 2 exams; (mid-term exam 33%, final exam 67%) = 33% course grade
- b. Lab Reports and Essay 33% course grade
- c. Lab Participation 33% course grade (Lab notebook, homework, skill demonstrated in lab)
(*Five points will be subtracted for each unexcused absence.*)

A = 90%–100%; B = 80%–89%; C = 70%–79%; D = 60%–69%; F = <60%
WN will be used in accordance with University procedure.

University/Course Policies. (See below)

- Americans with Disabilities Amendment Act
- Fire Drill Policy
- Diversity Awareness Policy <http://www.mcneese.edu/policy/docs/Non-Discrimination%20Policy%20Revised%20%209-16-08.pdf>
- Academic Integrity Policy (available at www.mcneese.edu/integrity)
- Attendance Policy and
- course-specific policies

ADAA Accommodation statement:

It is each student's responsibility to register with the Office of Services for Students with Disabilities when requesting an accommodation. Any student with a disability is encouraged to contact the Office of Services for Students with Disabilities, Drew Hall, Room 200, (337) 475-5916 Voice, (337) 475-5878 FAX, (337) 562-4227 TDD/TTY, Hearing Impaired. 475-5722.

A student with a disability is responsible for locating the designated emergency exits, the areas of refuge in a classroom building, and is encouraged to develop and discuss the evacuation plan with the faculty member.

Fire Drill Policy:

McNeese State University will periodically conduct fire drills. In the event of a fire drill or a related building emergency, all persons in a classroom are required to exit the building using posted escape routes or the **Area of Refuge** for individuals with disabilities.

Diversity Statement: Students should visit the MSU web page at <http://www.mcneese.edu/policy/diversity.htm> for information about diversity awareness and sexual harassment policies and procedures.

Academic Integrity Statement: McNeese State University seeks to strengthen the value of student academic achievement by fostering a learning environment which is based on honesty, respect, fairness, responsibility, and excellence. Consequently, the University expects students to demonstrate honesty and integrity in all academic relationships. For details on this policy, please visit: <http://www.mcneese.edu/integrity/> .

Attendance Policy: Attendance is mandatory for lab sessions and optional for study sessions. Class attendance regulations as stated on the MSU web site will be adhered to and followed. To become familiar with the attendance policy, students should view <http://www.mcneese.edu/policy/attendance.php>. If a lab or an exam is missed, the student must present a valid excuse to the instructor at the first class period he or she returns to class.

Acceptable excused absences for tests include:

1) personal illness with a doctor's excuse, 2) an official university function (with a university excuse), or 3) a death in the student's immediate family. The student is responsible for making arrangements for the date, time, and place of the make-up exam or assignment. If you have a university-excused absence or problem, please contact the instructor in advance.

Laboratory Safety/Rules:

♦ Students should wear proper attire for lab sessions including closed-toe shoes. **OSHA approved safety glasses are required in all chemistry labs.** For information about eye safety link to: <http://www.eyesafety.4ursafety.com/eye-safety-training.html> Aprons and gloves may be required for some sessions.

♦ Hazardous waste material must be disposed of according to directions given in lab sessions.

♦ Cell phone use is not permitted during the pre-lab lecture or laboratory sessions. Please notify instructor should you need to use a cell phone during laboratory sessions due to an emergency situation.

No food or drink is allowed in the chemistry laboratories.

SEMESTER SEQUENCE

Review of 301, Safety & Disposal Practices, Experiment Reports

Lab meetings during the first week will include lectures on review of 301 essentials, IR, NMR, *safety practices, disposal practices, keeping of notebooks and write-ups* of technical lab reports and also a survey of *techniques and use of various pieces of apparatus*. Introduction to computer lab and equipment check out in the organic laboratory.

Introductory Techniques for Microscale Lab: Calibrating a Thermometer and Preparation of a Micropycnometer, and Density and BPT Determinations (3 Labs)

Exp. 1 A Calibration of a Thermometer

Exp. 2 B Determination of Liquid Densities Using a Pycnometer; B.Pt. Determination

Part A. Separation Techniques (6 Labs)

You will be given a solution of benzoic acid, benzhydrol, biphenyl in chloroform and will be required to obtain a sample of each component and to verify its purity by conventional methods.

- 1) Extraction of benzoic acid, recrystallization; melting point determination.
- 2) Simple Distillation, fractional distillation; g.c. analysis of fractions.
- 3) Fractional Crystallizations (benzhydrol and biphenyl) ; melting point determinations.
- 4) Chromatography: separation of benzhydrol and biphenyl by column chromatography ; TLC analysis of fractions, use of I₂ chambers and UV chamber.

Part B. Natural Products Chemistry (6 Labs)

You will extract two or three natural products and check the purity of the extracts by microscale techniques.

- 1) Extraction of caffeine from tea; recrystallization and sublimation of caffeine, melting point determination
- 2) Isolation of cinnamaldehyde from cinnamon sticks (steam distillation); ir spectrum analysis
- 3) Isolation of carotenoid pigments from crawfish; thin layer chromatography

Part C. Qualitative Organic Chemistry/Spectroscopy/G.C. (6 Labs)

You will perform Awet chemistry@ on 3 unknown compounds in order to identify the functional groups that are present. Spectroscopy (NMR,IR) and G.C. will be used to confirm the functionality and to identify the compound.

Part D. Kinetics (2 Labs)

This series of experiments examines the factors that affect the rate of S_N1 solvolysis of *tert*-butyl halides. The rate at which an indicator changes color will be monitored as a function of the medium, the substrate and the temperature.

- 1) The effect of solvent polarity (100% MeOH to 100% water).
- 2) The effect of the leaving group (RCL vs. RBr).
- 3) The effect of temperature/generation of an Arrhenius plot.

Part E. Synthesis (3 Labs)

This series will expose you to more synthetic techniques. A purification is inherent in this experiment; you will be required to gauge the purity of your product by conventional methods (TLC, G.C. m.p. etc.,). Multistep syntheses are also introduced.

Preparation of triphenylcarbinol by Grignard reaction of phenyl magnesium bromide with benzophenone.

Part F. Technology (All semester) These activities will depend upon the equipment and programs that are available. You will learn to effectively use Chem Draw and/or Chem Sketch programs in the preparation of ACS-style reports.